

### Claims

What is claimed is:

1. Apparatus for creating a cavity in a bone, said cavity (i) having a cross section which has a generally triangular profile having a first side generally parallel with an axis of the bone and a second side forming an acute angle with the first side, and (ii) being contiguous with a pre-existing conical cavity in the bone, said apparatus comprising:
  - a drive shaft having an axis, a proximal end configured for coupling to a drive means and a distal end configured to form a portion of a drive joint for coupling the drive shaft to a cutter;
  - a frame for carrying a cutter, the frame including a shaft having a longitudinal axis and a cutter mount for mounting a cutter at a first angle approximating the acute angle with respect to the shaft, the mount including a bracket extending laterally from the shaft to a bearing configured to receive a portion of a cutter and maintain the received cutter oriented at the first angle during rotation;
  - a cutter for cutting said cavity, the cutter having a head configured to form a portion of a drive joint for coupling the cutter to a drive shaft; and,
    - wherein the drive shaft is coupled to the cutter to form the drive joint, the cutter is received in the mount at the first angle and the axis of the drive shaft forms a second angle with the longitudinal axis less than the first angle.

2. The device of claim 1 wherein the axis of the drive shaft is substantially parallel to the longitudinal axis of the shaft.

3. The device of claim 2 and further comprising a sleeve disposed about portions of the drive shaft adjacent the cutter.

4. The device of claim 3 and further comprising a drive shaft bracket coupled to the frame and configured to receive the drive shaft therein and maintain the  
5 orientation of the axis of the drive shaft with respect to the longitudinal axis of the frame.

5. The device of claim 3 wherein the drive shaft and sleeve are mounted to the frame to move relative thereto to facilitate loading and removal of a cutter.

6. The device of claim 3 and further comprising a plate mounted  
10 substantially perpendicular to the longitudinal axis of the shaft and configured to transfer forces applied to the plate to the shaft.

7. The device of claim 4 and further comprising a miller shell for registering the apparatus with the pre-existing conical cavity, the miller shell having a longitudinal axis, an external surface a portion of which engages the wall of the pre-  
15 existing conical cavity, and a shell configured to receive the frame and allowing the frame to move along the longitudinal axis.

8. The device of claim 7 and further comprising indicators for indicating the longitudinal location of the miller frame relative to the miller shell.

9. The apparatus of claim 3 wherein the cutter comprises a cutting  
20 surface having an outer diameter and a bearing surface at one end of the cutting surface having an outer diameter larger than the outer diameter of the cutting surface and wherein the bearing for receiving the cutter comprises a bearing surface for mating with said bearing surface of the cutter.

10. Apparatus for creating a cavity in a bone for receiving a prosthesis which has a conical portion and a projection of a generally triangular profile, said apparatus comprising:

- a shell comprising a conical portion which defines a longitudinal axis and a shaft-receiving cavity for receiving a frame;
- 5 a frame having a shaft, a drive shaft and a shield, the shaft being received by the shaft-receiving cavity and being movable with respect to the shell along the longitudinal axis, said frame configured to carry a cutter disposed at an acute angle relative to the longitudinal axis, the drive shaft being disposed at an angle relative to the longitudinal axis less than the acute angle being configured at one end to couple to and drive the cutter and the shield being disposed about portions of the drive shaft adjacent the one end; and
- 10 a cutter for cutting a cavity having a generally triangular profile, said cutter being carried by said frame and being configured to mate with and be driven by the drive shaft.

11. The apparatus of claim 10 wherein the cutter and the frame include mating bearing surfaces.

12. The apparatus of claim 11 wherein the frame includes a bracket for maintaining the orientation of the drive shaft relative to the shaft.

13. The apparatus of claim 12 wherein the drive shaft is maintained in an orientation substantially parallel to the shaft.

20 14. The apparatus of claim 10 wherein the cutter and the drive shaft are configured to cooperate to form a pinned-sleeve shaft coupling.

15. The apparatus of claim 14 wherein the drive shaft includes a slotted end forming forks.

16. A method for cutting a triangular cavity in bone comprising:  
providing a cutter which comprises a cutting surface having an outer diameter and a cutter bearing at one end of the cutting surface having an outer diameter larger than the outer diameter of the cutting surface;

5 providing a frame having a shaft movable relative to the bone to be prepared which comprises a frame bearing which is complementary to the cutter bearing and which has an inner diameter which is larger than the outer diameter of the cutter's cutting surface and is configured to hold the bearing at a first acute angle relative to the shaft, the shaft having a width extending between the shaft and the bearing;

10 journaling the cutter bearing in the frame by passing the cutter's cutting surface through the frame bearing and engaging the cutter bearing with the frame bearing;

incising the patient adjacent the bone to be prepared to form an incision having a length approximating the width of the provided frame;

15 providing a drive shaft portions of which being configured to couple to and drive the cutter with the drive shaft disposed at a second angle relative to the shaft which second angle is less than the first angle,

cutting the cavity by driving the cutter with the drive shaft disposed at the second angle and moving the frame relative to the bone.

20 17. The method of claim 16 and further comprising the step of providing a shield around portions of the drive shaft adjacent the cutter.

18. The method of claim 17 wherein the provided frame includes a bracket for maintaining the drive shaft substantially parallel to the shaft.